CLAIMS:

1. A semiconductor element heat dissipating member comprising:

a conductive substrate; and

an electrically insulating amorphous carbon film including hydrogen,

wherein the electrically insulating amorphous carbon film is provided at least on a region of the conductive substrate on which region a semiconductor element is to be provided.

2. The semiconductor element heat dissipating member according to claim 1, wherein a content of hydrogen in the electrically insulating amorphous carbon film is in the range of 20 to 60 at.%.

3. The semiconductor element heat dissipating member according to claim 1, wherein the electrically insulating amorphous carbon film further includes silicon.

4. The semiconductor element heat dissipating member according to claim 3, wherein a content of silicon in the electrically insulating amorphous carbon film is in the range of 1 to 50 at.%.

5. The semiconductor element heat dissipating member according to claim 1, wherein an electrically insulating organic film is provided on the side of the electrically insulating amorphous carbon film on which side the semiconductor element is to be provided.

6. The semiconductor element heat dissipating member according to claim 1, wherein the conductive substrate is a metal substrate containing at least one of Al, Cu, Mo, W, Si and Fe.

7. The semiconductor element heat dissipating member according to claim 1, wherein the semiconductor element is a large-scale integrated circuit, or a power device selected from a bipolar-type transistor, an MOS-type transistor, or a diode.

8. The semiconductor element heat dissipating member according to claim 1, wherein an elastic modulus of the electrically insulating amorphous carbon film is 40 to 150 GPa.

9. The semiconductor element heat dissipating member according to claim 1, wherein a Vickers hardness of the electrically insulating amorphous carbon film is Hv 400 to 1500.

10. The semiconductor element heat dissipating member according to claim 1, wherein a thickness of the electrically insulating amorphous carbon film is 0.1 to 200 μm.

11. A method of producing a semiconductor element heat dissipating member of claim 1, the method comprising:

forming an electrically insulating amorphous carbon film including hydrogen on a conductive substrate,

wherein the electrically insulating amorphous carbon film is formed by a

plasma CVD method.

12. The method of producing a semiconductor element heat dissipating member according to claim 11, the method comprising conducting a glow discharge,

wherein in the glow discharge, a plurality of conductive substrates connected to a cathode are arranged in a deposition furnace such that the plurality of conductive substrates face each other, and a sheath width is adjusted such that negative glows of two adjacent conductive substrates overlap each other.

13. The method of producing semiconductor element heat dissipating member according to claim 12,

wherein the plurality of the conductive substrates are held by a substrate holding element connected to the cathode.

14. The method of producing a semiconductor element heat dissipating member according to claim 12, wherein in the glow discharge, the sheath width is adjusted by adjusting a pressure of a processing gas and a plasma electric power such that negative glows of two adjacent conductive substrates overlap each other.

15. The method of producing a semiconductor element heat dissipating member according to claim 12, wherein the sheath width satisfies the following expression:

$D/4 \leq S \leq D$

wherein S represents the sheath width, and D represents a distance between surfaces of the conductive substrates which surfaces face each other.

16. The method of producing a semiconductor element heat dissipating member according to claim 14, wherein:

a pressure of the processing gas is 13 to 1330 Pa, and

the distance between surfaces of two adjacent conductive substrates which surfaces face each other is 2 to 60 mm.

17. The method of producing a semiconductor element heat dissipating member according to claim 11, wherein the processing gas used in the plasma CVD method consists of a raw material gas including a hydrocarbon gas, or consists of a raw material gas including a hydrocarbon gas and a dilution gas including at least one of hydrogen gas and a noble gas.

18. The method of producing a semiconductor element heat dissipating member according to claim 17,

wherein the raw material gas further includes at least one of a halogen compound and an organic-metal including gas including silicon.

19. A method of producing a semiconductor element heat dissipating member of claim 5 comprising:

forming the electrically insulating amorphous carbon film, and then

forming the electrically insulating organic film on a surface of the electrically insulating amorphous carbon film,

wherein the electrically insulating organic film is formed by an electrophoresis.

20. A semiconductor device comprising a semiconductor element heat dissipating member of claim 1 and at least one semiconductor element provided on the semiconductor element heat dissipating member.